Complete Summary

GUIDELINE TITLE

Pulmonary embolism/infarction.

BIBLIOGRAPHIC SOURCE(S)

Pulmonary embolism/infarction. Philadelphia (PA): Intracorp; 2005. Various p. [28 references]

GUIDELINE STATUS

This is the current release of the guideline.

All Intracorp guidelines are reviewed annually and updated as necessary, but no less frequently than every 2 years. This guideline is effective from April 1, 2005 to April 1, 2007.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
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SCOPE

DISEASE/CONDITION(S)

Pulmonary embolism/infarction

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Prevention
Treatment

CLINICAL SPECIALTY

Critical Care
Emergency Medicine
Family Practice
Internal Medicine
Pulmonary Medicine
Surgery

INTENDED USERS

Allied Health Personnel
Health Care Providers
Health Plans
Hospitals
Managed Care Organizations
Utilization Management

GUIDELINE OBJECTIVE(S)

To present recommendations for the diagnosis, treatment, and management of pulmonary embolism/infarction that will assist medical management leaders to make appropriate benefit coverage determinations

TARGET POPULATION

Individuals with pulmonary embolism/infarction

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis/Evaluation

1. Physical examination and assessment of signs and symptoms
2. Diagnostic tests
    - Chest x-ray (CXR)
    - Electrocardiography (ECG)
    - Arterial blood gasses (ABGs)
    - Plasma D-dimer enzyme-linked immunosorbent assay (ELISA)
    - Ventilation/perfusion (V/Q)
    - Spiral computed tomography (CT)
    - Compressive duplex ultrasonography of lower extremity
    - Pulmonary angiography/arteriography
    - Gadolinium-enhanced magnetic resonance angiography (MRA) of pulmonary arteries
    - Blood work (complete blood counts and coagulation studies)

Management/Treatment

1. Acute therapy
    - Oxygen therapy

- Anticoagulation (intravenous heparin, low-molecular weight heparin [Levonox], warfarin [Coumadin])
- Thrombolysis (streptokinase, tissue plasminogen activator [TPA], urokinase)
- Surgery (acute pulmonary artery embolectomy or catheter-directed embolectomy/fragmentation)

2. Long-term therapy
    - Daily warfarin
    - Lifetime oral anticoagulation, if indicated
    - Insertion of inferior vena cava (IVC) filter
3. Referral to specialists

MAJOR OUTCOMES CONSIDERED

Sensitivity, specificity, and utility of diagnostic tests

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Searches were performed of the following resources: reviews by independent medical technology assessment vendors (such as the Cochrane Library, HAYES); PubMed; MD Consult; the Centers for Disease Control and Prevention (CDC); the U.S. Food and Drug Administration (FDA); professional society position statements and recommended guidelines; peer reviewed medical and technology publications and journals; medical journals by specialty; National Library of Medicine; Agency for Healthcare Research and Quality; Centers for Medicare and Medicaid Services; and Federal and State Jurisdictional mandates.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Review
Review of Published Meta-Analyses

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

A draft Clinical Resource Tool (CRT or guideline) is prepared by a primary researcher and presented to the Medical Technology Assessment Committee or the Intracorp Guideline Quality Committee, dependent upon guideline product type.

The Medical Technology Assessment Committee is the governing body for the assessment of emerging and evolving technology. This Committee is comprised of a Medical Technology Assessment Medical Director, the Benefit and Coverage Medical Director, CIGNA Pharmacy, physicians from across the enterprise, the Clinical Resource Unit staff, Legal Department, Operations, and Quality. The Intracorp Guideline Quality Committee is similarly staffed by Senior and Associate Disability Medical Directors.

Revisions are suggested and considered. A vote is taken for acceptance or denial of the CRT.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Comparison with Guidelines from Other Groups
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Diagnostic Confirmation

Subjective Findings

- Pleuritic chest pain usually of sudden onset
- Dyspnea
- Respiratory distress; rapid respiratory rate, shortness of breath
- Apprehension

Objective Findings

- Cough
- Neck vein distention
- Tachypnea
- Tachycardia
- Hypotension
- Syncope (loss of consciousness)
- Diaphoresis; low-grade fever
- Arterial hypoxemia (helpful, but not necessary for the diagnosis)
- Cyanosis
- Tricuspid insufficiency murmur, rales, wheeze, and/or pleural friction rub on chest auscultation
- Hemoptysis
- Coincident evidence of deep vein thrombosis
- One or more risk factors by history

Diagnostic Tests

- Chest x-ray (CXR) may be normal - significant findings include elevated diaphragm; pleural effusion; pulmonary artery dilation; atelectasis, infiltrate or consolidation
- Electrocardiography (ECG/EKG)
    - Most common EKG change is T-wave inversion in leads V1-V4, reflecting right ventricular strain.
    - Other abnormal findings: sinus tachycardia, acute right bundle branch block (RBBB), new onset atrial fibrillation, ST segment depression in lead II
- Arterial blood gasses (ABGs): increased pH, decreased PaO_2 and $PaCO_2$ concentrations
- Plasma D-dimer enzyme-linked immunosorbent assay (ELISA) testing: detects the presence of plasmin-mediated fibrin (clot-forming) degradation products
    - Normal plasma D-dimer can be useful to rule out pulmonary embolism (PE) in those with non-diagnostic lung scan.
    - Cannot be used to definitely "rule in" PE, as other disorders cause elevations (sepsis, postoperative or trauma status, metastatic cancer)

    - May be helpful if patient with indeterminate ventilation/perfusion (V/Q) scan if used in conjunction with lower extremity compression ultrasonography: absence of deep vein thrombosis (DVT) and normal D-dimer rules out clinically significant PE
- Ventilation/perfusion (V/Q) lung scan; historically performed on all patients with suspected pulmonary emboli
    - Of limited usefulness due to high percentage of non-diagnostic studies
    - A V/Q mismatch is suggestive of pulmonary embolism but is not by itself diagnostic; a lung scan should follow.
- Spiral computed tomography (CT) is a newer, more sensitive modality in the diagnosis of PE.
    - Has generally replaced V/Q scanning as principal imaging study
    - May identify other pulmonary pathology whose symptoms mimic PE
    - May aid in provider decision to withhold anticoagulant therapy with low clinical suspicion for PE
    - Sensitivity is not high enough to determine withholding of anticoagulation in patients with intermediate/high clinical suspicion and a negative scan.
- If clinical suspicion for PE is high, yet lung scan/spiral CT reveals low, moderate, or indeterminate probability of PE; compressive duplex ultrasonography of lower extremities is useful:
    - (+) result on compressive duplex ultrasonography avoids angiogram; intravenous anticoagulation is indicated
    - (-) result on compressive duplex ultrasonography indicates need to go to angiogram
- Pulmonary angiography/arteriography is the diagnostic gold standard for PE, however
    - It is invasive, costly
    - May not be available in some clinical settings
- Gadolinium-enhanced magnetic resonance angiography (MRA) of pulmonary arteries has high-specificity but only moderate sensitivity for diagnosing PE.
    - Best reserved for selected patients at high risk to undergo standard pulmonary angiography
- Other lab work: Complete blood counts and coagulation studies should be obtained
    - Baseline prior to starting anticoagulation and/or thrombolytic therapy
    - At intervals during treatment to monitor efficacy

Differential Diagnosis

- Pneumonia
- Pleuritis
- Pneumothorax
- Myocardial ischemia/infarction
- Pulmonary contusion
- Rib fracture
- Esophageal varices/esophagitis
- Shingles
- Spinal or neuropathic pain

Treatment

Treatment Options

- Acute therapy
    - Oxygen therapy to correct hypoxia, pulmonary hypertension, and relieve pulmonary vasoconstriction.
    - Anticoagulation- continuous infusion intravenous heparin therapy should be started in any patient with high clinical suspicion of PE even before diagnostic studies are complete.
        - Heparin remains the drug of choice therapy for acute PE.
        - Low-molecular weight heparin (Lovenox) also effective; requires less frequent blood work to monitor
        - Warfarin (Coumadin) should be started while heparinization underway; when clotting times are therapeutic, heparin can be discontinued.
    - Thrombolysis - streptokinase, tissue plasminogen activator (TPA), urokinase followed by anticoagulation therapy indicated for patients with large PE who are hemodynamically unstable.
    - Surgery - acute pulmonary artery embolectomy, or catheter-directed embolectomy/fragmentation may be indicated for those with massive PE and arterial hypotension and/or persistent hypoxemia refractory to high concentrations of inspired oxygen
- Long-term therapy
    - Warfarin generally continued daily to maintain an international normalized ratio (INR) of 2.0 to 3.0.
    - The duration of anticoagulation is not firmly established following acute PE, but some recent studies suggest that therapeutic oral anticoagulation should be continued for at least 6 months.
        - Patients with recurrent PE should be evaluated for hypercoagulable states and could need lifetime oral anticoagulation.
    - Insertion of inferior vena cava (IVC) filter
        - If thrombolytics and anticoagulants are contraindicated (gastrointestinal bleeding, recent neurosurgery, multiple trauma) or recurrent PE despite therapeutic anticoagulation
        - If recurrent PE despite appropriate therapeutic anticoagulation

Duration of Medical Treatment

- Medical - Optimal: 14 day(s), Maximal: 180 day(s)

Additional information regarding primary care visit schedules, referral options, and specialty care is provided in the original guideline document.

The original guideline document also provides a list of red flags that may affect disability duration, and return to work goals, including

- After hospitalization and medical treatment
- After hospitalization and surgical treatment

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is not specifically stated for each recommendation.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate diagnosis, treatment, and management of pulmonary embolism/infarction to assist medical management leaders to make appropriate benefit coverage determinations

POTENTIAL HARMS

Not stated

CONTRAINDICATIONS

CONTRAINDICATIONS

Thrombolytics and anticoagulants are contraindicated in patients with gastrointestinal bleeding, recent neurosurgery, and multiple trauma.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Staying Healthy

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1997 (revised 2005)

GUIDELINE DEVELOPER(S)

Intracorp - Public For Profit Organization

SOURCE(S) OF FUNDING

Intracorp

GUIDELINE COMMITTEE

CIGNA Clinical Resources Unit (CRU)
Intracorp Disability Clinical Advisory Team (DCAT)
Medical Technology Assessment Committee (MTAC)
Intracorp Guideline Quality Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Not stated

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

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GUIDELINE AVAILABILITY

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Reprints of complete guideline content may be purchased for $35.00 per title (plus tax in TX at 8.25% and CT at 1.0%). Please send e-mail request to lbowman@mail.intracorp.com.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Policies and procedures. Medical Technology Assessment Committee Review Process. Philadelphia (PA): Intracorp; 2004. 4 p.
- Online guideline user trial. Register for Claims Toolbox access at www.intracorp.com.

Licensing information and pricing: Available from Intracorp, 1601 Chestnut Street, TL-09C, Philadelphia, PA 19192; e-mail: lbowman@mail.intracorp.com.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on May 31, 2005. The information was verified by the guideline developer on June 7, 2005.

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